



~~Resolver I/O Terminal Structure and Method of Connecting Resolver~~
Thereby TERMINAL FOR A RESOLVER

CROSS-REFERENCE TO RELATED APPLICATIONS ~~Cross-Reference to Related Applications~~

[0001] This application claims ~~all rights~~ the benefit of ~~priority to~~ Japanese Patent Application No. 2002-279578 entitled "Resolver I/O Terminal Structure and Method of Connecting Resolver Thereby," naming the same inventors, filed on September 25, 2002, ~~(pending)~~ claiming priority benefits under 35 USC §119.

BACKGROUND ~~Field of the Invention~~

[0002] The present invention relates to ~~resolver I/O terminal structures that can endure use~~ resolvers. More particularly, the present invention relates to terminals on resolvers that may be used at high temperatures, and to resolver connection methods using said structures.

Background of the Invention

[0003] Resolvers are electrical devices that are most often used as angle measurement transducers. Various types of resolvers have been developed in order to reduce ~~the~~ their size of the resolvers and increase their performance. ~~For example, there are resolvers that are structured by providing pins in an insulator extension part, which is integrated with the insulating member, where the stator coil wires are connected to these pins and the lead lines or connectors are then connected. (See, for example, Patent Reference 1.) These resolvers successfully reduced the use of insulating material, and successfully reduced the resolver size, by connecting the stator~~

~~coil wires to the pins equipped in the insulating members. However, because the insulating extension part was integrated with the insulating member, there was the drawback that [the structure] was weak when it comes to retraction forces.~~

[0004] ~~On the other hand, there were also resolvers that had connectors with either female connector pins or male connector pins integrated with an~~ One type of resolver includes insulating cover members. To connect to the resolver, pins are included in order to increase an extension part of an insulating member. The wires of the aforementioned retraction force, where not only would the aforementioned stator coils be connected coil of the resolver connect to said connector pins, but also external connectors could be connected to and disconnected from said connectors freely. (See, for the pins, as do the lead wires or an electrical connector on the resolver. An example, of such a resolver is disclosed in Japanese Unexamined Patent Reference 2.) Although these resolvers were strong Application Publication H 10-309067. Making the resolver smaller reduces the amount of insulating material. But because the extension part with the pins is integrated into the insulating member a smaller amount of insulating material renders the extension part more susceptible to breakage when it comes making an electrical connection to the aforementioned retraction because they were equipped with connectors that had connector pins integrated with the insulating cover, reducing the size [of said resolvers] was difficult resolver.

[0005] ~~There were also~~ Other types of resolvers structured, as a way to resolve include connectors with male or female connector pins that are integrated with an insulating cover of the aforementioned problem areas, by providing terminal holders within notched parts fabricated at a part of resolver. An example of such a resolver is

disclosed in Japanese Unexamined Patent Application Publication 2001-330472. The integration of the outer periphery of a ring-shaped stator where lead lines were provided along pins with the axial direction of insulating cover makes the ring-shaped stator, connectors mechanically stronger. As such, external connectors may be attached and where removed from the various covers were made flat in order to achieve a structure that was thinner and that had a smaller diameter. (See, for example, Patent Reference 3.) resolver with ease. The wires of the stator coils connect to the pins. But because the pins are integrated with insulating cover, reducing the size of such resolvers is difficult.

[0006] Yet other types of resolvers have terminal holders within notched parts on the outer periphery of a ring-shaped stator. An example of such a resolver is disclosed in Japanese Unexamined Patent Application Publication 2001-56237. The lead lines to the resolver are along the axial direction of the stator. For these types of resolver, the various corners on the resolver are flat, resulting in a thinner structure with a smaller diameter.

[0007] Further, all the above-described resolvers operated at normal temperatures and could not withstand high temperatures. An example of a high temperature resolver is shown in Fig. 8. The stator of the resolver includes a stator core 100 comprising multiple layers of plates. Stator magnetic poles 104 protrude from the stator core 100 towards the center of the yoke of the resolver and have multiple stator magnetic pole teeth 103. The wires of the stator coils (not shown) wrap around the stator magnetic poles 104. Two insulating members 101, 107 are on either side of the stator core 100. The periphery of the stator core 100 includes protrusion parts 102,

which in turn include grooves 108 to hold the lead wires 111. The grooves 108 also include terminal plates 105.

[0008] Fig. 9 is a diagram illustrating a terminal plate 105. The bottom part of the terminal plate 105 is rooted in the groove 108 and has a rim-shaped weld part 120 at the top of the terminal plate 105. The weld part 120 is bent and has an end of stator coil wire 130 attached to it by resistance welding or high-temperature soldering. The stator coil wire 130 is also wrapped around the top part of the terminal plate 105.

[0009] Fig 10 is a diagram illustrating a lead wire 111. The lead wire 111 has a core 109 and a covering 106. Some of the core 109 may be exposed at the tip of the lead wire 111 by means of a mechanical or chemical process. Returning to Fig. 9, the core 109 is wrapped under the weld part 120 of the terminal plate 105.

[0010] The resolver of Fig. 8, however, is hard to miniaturize and manufacture through automation. For operation at high temperature, the insulation on the stator coil wires 130 is highly durable, for example polyamideimide insulation. The connections require resistive welding or high-temperature soldering but the weld part 120 must be large enough to accommodate the electrode of the resistive welder. Also, as the terminal plates 105 are in the grooves 108 during welding or soldering, it is difficult to reduce the size of terminal plates 105.

[0011] Additional problem with miniaturizing the resolver of Fig. 8 include the removal of insulation on the stator coil wires 130 in order to perform high-temperature soldering. The mechanical or chemical method for removing the insulation may affect the reliability of the resolver. Also, the automatic winding equipment for winding the stator coil wires 130 on such a resolver may be complicated.

BRIEF SUMMARYSummary

[0012] ~~In general, in a first aspect, the present invention is a resolver I/O terminal device in a resolver equipped with~~A terminal for a resolver is described below to address the need for a stator assembly equipped with a core wherein there are multiple stacked plate-shaped units with protruding stator magnetic poles~~sturdy connector for resolvers that have multiple stator magnetic pole teeth in a direction facing a center~~operate at high-temperatures. One aspect of a yoke part, one insulating member and another insulating member equipped on both sides of said stator core in the axial direction, and a lead line~~invention is a terminal that includes a terminal block wherein the stator coils, which are wrapped on the stator magnetic poles, are connected to lead lines; wherein said lead line~~having a top side and a bottom side. The terminal block not only has embedded within it fastening pins for winding the stator coil terminals, but is also provided with multiple~~a lengthwise open through holes~~groove between the top side and the bottom side. The terminal also includes at least one flat terminal disposed widthwise on the bottom side of the terminal block and has a~~traversing the through groove in the direction in which said multiple through holes are lined up, and equipped with flat terminals, provided with. Each flat terminal pin parts that contact said lead lines and stator coil wires, and are equipped horizontally on said lead line terminal blocks so as to cut across said through groove, where the tips of said lead lines are equipped with connection terminals that connect to said~~the at least one flat terminal pin parts has a top side adjacent the through groove and a bottom side comprising a weld part for retaining stator coil wire of the resolver. In this manner the stator coil wire may be welded to the flat terminal by contacting a first electrode of a

resistive welder to the top side of the flat terminal via the through groove and contacting a second electrode of the resistive welder to the weld part.

[0013] Another aspect of the invention is a terminal that includes a terminal block and means for connecting a stator coil wire to the terminal by welding. The means for connecting the stator coil wire is attached to the terminal block. The terminal also includes means for connecting a lead line to the terminal. The means for connecting the lead line is attached to the terminal block and is in electrical communication with the means for connecting the stator coil wire.

[0014] Yet another aspect of the invention is a resolver that includes the combination of a stator core, at least one stator coil, a terminal block, and at least one flat terminal. The at least one stator coil includes stator coil wires wound on the stator core. The terminal block has a top side and a bottom side and a lengthwise open through groove between the top side and the bottom side. The at least one flat terminal is disposed widthwise on the bottom side of the terminal block and traverses the through groove. Each flat terminal of the at least one flat terminal has a top side adjacent the through groove and a bottom side comprising a weld part for retaining the stator coil wire. In this manner the stator coil wire is welded to the flat terminal by contacting a first electrode of a resistive welder to the top side of the flat terminal via the through groove and contacting a second electrode of the resistive welder to the weld part.

[0015] The foregoing and other features and advantages of preferred embodiments will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS Brief Description of the Drawings

[0016] ~~Figure~~Fig. 1 is an ~~assembly~~a diagram showing a preferred
embodiment of a stator assembly unit ~~according to the present invention~~of a resolver;

[0017] ~~Figure~~Fig. 2 is an ~~assembly~~underside diagramview of the stator core,
~~the other insulating member, and~~assembly 1 of Fig. 1;

[0018] Fig. 3 are views of the structure of the lead-line terminal blocks
according to the present inventionof Fig. 1;

~~Figure 3 is an oblique view of a lead-line terminal block according to the present~~
~~invention, where Figure 3(a) is an oblique view of the top, Figure 3(b) is an oblique view~~
~~of the bottom, and Figure 3(c) is an expanded view of the area around the flat terminal;~~

[0019] ~~Figure~~Fig. 4 ~~shows~~is a diagram showing a cross-sectional view along
section A-B of ~~Figure 2~~ of a part of the stator assembly ~~according to the present~~
~~invention~~of Fig. 1;

[0020] ~~Figure~~Fig. 5 ~~shows~~is a diagram showing another cross-sectional view
along section C-D of ~~Figure 2~~ of a part of the stator assembly ~~according to the present~~
~~invention~~of Fig. 1;

[0021] ~~Figure~~Fig. 6 is an ~~oblique view~~a diagram of a flat terminal ~~according to~~
~~the present invention~~;

[0022] ~~Figure~~ Fig. 7 is an ~~assembly~~a diagram showingillustrating another
~~example~~preferred embodiment of a the stator assembly unit ~~according to the present~~
~~invention~~of Fig. 1;

[0023] ~~Figure 8 shows~~ Fig. 8 is a front view ~~(a) and back view (b)~~diagram
illustrating an example of a ~~conventional~~high temperature resolver-stator;

[0024] ~~Figure~~Fig. 9 ~~shows~~is a ~~drawing~~diagram ~~of~~illustrating a conventional terminal plate; and

[0025] ~~Figure~~Fig. 10 ~~shows~~is a ~~drawing~~diagram ~~showing~~illustrating a conventional lead linewire.

DETAILED DESCRIPTIONDetailed Description of the Preferred Embodiments

~~The use temperatures for all of the resolvers described above were normal temperatures, and none could withstand use in particularly high temperatures. Resolvers capable of withstanding use at high temperatures are structured, for example, as shown in Figure 8. As is shown in Figure 8, the stator in the resolver is equipped with a stator core 100 that comprises multiple layers of plates with protruding stator magnetic poles 104 that have multiple stator magnetic pole teeth 103 protruding in a direction facing the center of a yoke part, one insulating member 101 and another insulating member 107 equipped, respectively, on both sides of said stator core 100, and stator coil wires, not shown, wrapped around said stator magnetic poles 104. Protrusion parts 102 are fabricated on the periphery of the stator core 100, a groove 108 to hold the lead lines 111 is fabricated on said protrusion part 102, and a terminal plate 105 is equipped in said groove 108.~~

~~As is shown in Figure 9, said terminal plate 105 is fabricated with the bottom part (i) rooted in said groove 108, and a rim-shaped weld part 120 is bent at the top part. The stator coil wire end 130, which is wrapped on the top part of the terminal plate 105, passes between the weld parts 120, and then is resistance welded or high-temperature soldered to said weld part 120. Additionally, as shown in Figure 10, the core 109 in the lead line 111 is covered with a covering 106, where the tip 109 is wrapped under the weld part 120 of said terminal plate 105 after removing said covering 106 using a~~

~~mechanical method or a chemical method. Note that in Figure 8, the tip 109 of the lead line 111 is not shown.~~

~~(Patent Reference 1)~~

~~Japanese Unexamined Patent Application Publication H10-309067 (Figure 1)~~

~~(Patent Reference 2)~~

~~Japanese Unexamined Patent Application Publication 2001-330472 (Figure 1)~~

~~(Patent Reference 3)~~

~~Japanese Unexamined Patent Application Publication 2001-56237 (Figure 1)~~

~~The resolver shown in Figure 8, described above, is difficult in terms of miniaturization and in terms of automation. The reason for this is that in resolvers with high ambient temperatures, the insulation durability of the stator coil wires is high, using, for example, polyamidimid, but the connections require resistive welding or high-temperature soldering. For resistive welding, not only is there the need for the weld part to be large enough to handle the electrode of the resistive welder, but also terminal plates 105 must be equipped in said groove 108, and [thus] it is difficult to reduce the overall size of the terminal plates 105. Furthermore, because polyamidimid wires are used for the stator coil wires, there are problems in terms of reliability and in terms of ease of operation because of the need to remove the insulation coating, using a mechanical or a chemical method, when performing high-temperature soldering. Furthermore, the jig structure of automatic winding equipment in order to wind the stator coil wires in the state where they are attached to the stator is complicated for said lead lines.~~

~~The object of the present invention is to provide a resolver I/O terminal structure that is able to withstand use in a high temperature environment, and to provide a connection method for resolvers using said structure, in order to resolve these problems.~~

~~In order to achieve the object described above, the resolver I/O terminal device described in Claim 1 is a resolver I/O terminal device in a resolver equipped with a stator assembly equipped with a core wherein there are multiple stacked plate-shaped units with protruding stator magnetic poles that have multiple stator magnetic pole teeth in a direction facing a center of a yoke part, one insulating member and another insulating member equipped on both sides of said stator core in the axial direction, and a lead line terminal block wherein the stator coils, which are wrapped on the stator magnetic poles, are connected to lead lines, wherein said lead line terminal block not only has embedded within it fastening pins for winding the stator coil terminals, but is also provided with multiple through holes and has a through groove in the direction in which said multiple through holes are lined up, and equipped with flat terminals, provided with flat terminal pin parts that contact said lead lines and stator coil wires, and are equipped horizontally on said lead line terminal blocks so as to cut across said through groove, where the tips of said lead lines are equipped with connection terminals that connect to said flat terminal pin parts.~~

~~The resolver I/O terminal structure of Claim 2 is a resolver I/O terminal structure according to Claim 1, wherein said lead line terminal block is not only formed with multiple lead line fastening grooves on one surface thereof, but the opposite surface is equipped with slack pins to guide the stator wires to the side wherein said multiple~~

~~through holes are lined up, and fastening pins for wrapping the stator coil lead lines on the side opposite of where said slack pins are equipped, across said through groove, where said slack pins can be bent up easily from the base of said lead line terminal block.~~

~~The resolver I/O terminal structure of Claim 3 is a resolver I/O input structure according to Claim 1 or 2, where said lead line terminal block is fabricated with a surface whereon said fastening pins and slack pins are provided, and fabricated with a mating protrusion part on the other surface, where said mating protrusion part fits together with through holes fabricated in either said one insulating member or said other insulating member.~~

~~The resolver I/O terminal structure of Claim 4 is a resolver I/O terminal structure according to Claim 1, 2, or 3, wherein said lead line terminal block is fabricated with a rim part that contacts the stator core on the surface on the side opposite from said mating protrusion part.~~

~~The resolver I/O terminal structure of Claim 5 is a resolver I/O terminal structure according to any of Claims 1-4, wherein said lead line terminal block is fabricated separately from the one insulating member and from said other insulating member.~~

~~The resolver I/O terminal structure of Claim 6 is a resolver I/O terminal structure according to any of Claims 1-4, wherein said lead line terminal block is structured as an integrated unit with said one insulating member or with said other insulating member.~~

~~The resolver I/O terminal structure of Claim 7 is a resolver I/O terminal structure according to any of Claims 1-4, wherein said lead line terminal block is structured from a top terminal block and a bottom terminal block split between one surface and another~~

~~surface, where said top terminal block is structured as an integrated unit with one insulating member, and said bottom terminal block is structured as an integrated unit with said other insulating member.~~

~~The resolver I/O terminal structure of Claim 8 is a resolver I/O terminal structure according to Claim 1, wherein said flat terminal is such that said flat terminal pin part is deflected to an angle of approximately 90 degrees relative to the flat terminal and is not only inserted into an aforementioned through hole, but also passes through the other surface so that the flat terminal pin part that is passed through said through hole connects to a connector terminal equipped along said lead line fastening groove.~~

~~The resolver I/O terminal structure of Claim 9 is a resolver I/O terminal structure according to Claim 1, wherein said flat terminal is fabricated with a rim-shape weld part bent at the location wherein said through groove is crossed.~~

~~The resolver I/O terminal structure of Claim 10 is a resolver connection method in a resolver I/O terminal structure in a stator assembly equipped with a stator core, wherein there are multiple plates that are stacked with protruding stator magnetic poles that have multiple stator magnetic pole teeth that are protruding in the direction towards the center of a yoke part, one insulating member and another insulating member equipped, respectively, on both sides of said stator core, and a lead line terminal block wherein the lead lines for stator coils that are wound around said stator magnetic poles are connected, where said stator core is fabricated with a protruding part that has within it an indented part so as to fit with said lead line terminal block, where said lead line terminal block not only has multiple through holes and through grooves that are fabricated in the direction in which said multiple through holes are lined up, but also has,~~

~~on one surface, mating protrusion parts that mate with the through holes fabricated on either one of said insulating parts, as well as multiple lead line fastening grooves, where, on the other surface that is not said one surface, not only are there are embedded fastening pins upon which the stator coil terminals are wound along with slack pins that can be bent easily from the base position of said lead line terminal block, established and embedded in both sides of said through grooves, but also flat terminals equipped with flat terminal pin parts, which connect said lead lines to said stator coil lines, are equipped so as to cut across said through grooves, while, additionally, not only is there a rim part that mates with the stator core fabricated in said other surface and fastening protrusion parts fabricated in said other surface to mate with the through holes fabricated in said flat terminals, but also, said flat terminals are fabricated so that the weld part of said rim is fabricated in a place that cuts across said through groove and said flat terminal pin parts are bent to approximately 90 degrees to a direction that can be inserted into the multiple through holes fabricated in said lead line terminal block, wherein said resolver connection method is characterized by fastening the lead line terminal block, to which the flat terminals have been attached, to the stator core, winding the stator coils, using resistive welding to weld said weld parts to said stator coils, and are welding said flat terminal pin parts and the connector terminals.~~

~~The resolver I/O terminal structure of Claim 11 is a resolver connection method according to Claim 10, wherein, after fitting, into an indentation fabricated in a protrusion of the stator core, a lead line terminal part, wherein said fastening protrusions mate with through holes fabricated in the flat terminals, through the insertion of said flat terminal pin parts into said multiple through holes, the one insulating member and the other~~

~~insulating member are each tightly fitted from both sides of the stator core in order to mate the through holes fabricated in one or the other of the aforementioned insulating members with the aforementioned mating protrusion parts, and the tips of said mating protrusion parts are affixed in the insulating member to form a stator assembly.~~

~~The resolver I/O terminal structure of Claim 12 is a resolver connection method according to Claim 10, wherein stator coil leads are wrapped on said stator assembly, and the ends of said wrapped stator coil leads are passed through the slack pins and between the weld parts that are fabricated with a bend in said flat terminals, after which the tips thereof are wrapped on fastening pins, where the stator coil lead lines that are passed between said weld parts are welded to the flat terminals at said weld parts through resistive welding of said weld parts after inserting the electrodes of the resistive welder from the top and bottom of said through groove, and then bending said slack pins.~~

~~The resolver I/O terminal structure of Claim 13 is a resolver connection method according to Claim 10, wherein connection terminals of lead lines wherein connection terminals are pressed onto the tips thereof are equipped along said lead line affixing groove to mate with said connection terminals at said flat terminal pin part, which have passed through said one surface after being inserted into said multiple through holes, where said flat terminal pin part and the connection terminals are then are welded together.~~

[0026] ~~In order to understand the resolver I/O terminal structure of the present invention, the structure of the stator assembly 1 of the present invention, according to Figure 1, will be explained below based on an assembly diagram. In said stator~~

~~assembly 1, stator coil wires, such as polyamidimid wires, which are capable~~Fig. 1 is a
~~diagram showing a preferred embodiment of withstanding high temperatures, are~~
~~wrapped, and the resolver is formed out of well-known stators, housings, etc. Thea~~
~~stator assembly 1 is structured from a stator core 2, one insulating member 5 and~~
~~another insulating member 6 equipped, respectively, on both sides of saida resolver.~~
The stator assembly has a stator core 2 in the axial direction, covers 7 and 3 equipped
~~on the outsides thereof, and a lead line terminal block, fabricated separately from said~~
~~one insulating member 5 and said other insulating member 6. Said covers 7 and 3 both~~
~~have the same shape. Said insulating members 5 and 6, and said covers 7 and 3, are~~
~~fabricated from, for example, polybutylene terephthalate. The stator core~~
~~comprises~~comprising multiple stacked plates with stator magnetic poles 15. The stator
~~magnetic poles 15 with~~have multiple stator magnetmagnet pole teeth 14 directed in
~~the direction oftowards~~ a yoke part (not shown) of the resolver. Stator coil wires, (not
~~shown, are wound on)~~ wind around the stator magnetic poles 15. ~~Rim15 and may be~~
~~insulated by a material that can withstand high temperatures, such as polyamideimide.~~

[0027] On either axial side of the stator core 2 are insulating members 5, 6
which in turn have covers 3, 7 on their outsides. The insulating members 5, 6 have rim
~~parts 16, 18, which assumematch the same plane as said stator magnetic pole teeth 14,~~
~~and14. The insulating members 5, 6 also have protrusions 44 and44, 46, which fit,~~
~~respectively, fit into the holes 43 and43, 45 fabricated in the covers 7 and 3, are~~
~~fabricated in the one insulating member 5 and the other insulating member 6.7. The~~
~~insulating members 5, 6 and covers 3, 7 may be made of a polymer, such as~~
~~polybutylene teraphtlalate.~~

~~The outer periphery of the stator core 2 is equipped with protrusions 11 wherein indentations 12 that mate with the lead line terminal blocks 8 are fabricated, where the tips 13 of said protrusions 11 are fabricated to be bent, so that they do not deviate from the outer periphery direction when mated with said lead line terminal blocks 8 from the axial direction, not shown, of the stator 2. Protrusion parts 19 are fabricated in the other insulating member 6, where said protrusion parts 19 are equipped with notched parts 27 into which said lead line terminal blocks 8 can fit, and equipped with through holes 26 on the outside thereof. Similarly, the cover 3 is also equipped with protrusions 21 that have the same shape as the aforementioned protrusions 19, where said protrusions 21 are fabricated with indentations 28 into which said lead line terminal blocks 8 can fit.~~

[0028] The stator assembly 1 also includes a terminal block 8 that mates with indentations 12 in a protrusion 11 of the stator core 2. The tips 13 of the protrusions are deformable to align with the outer periphery of the stator assembly 1 when terminal block 8 is mated with the protrusion 11. The lower insulating member 6 has a protrusion 19. The terminal block 8 fits into a notched part 27 of the protrusion 19. The lower insulating member 6 also has through holes 26. Also, the lower cover 3 has a protrusion 21 with an indentation 28 that accepts the terminal block 8.

[0029] ~~Said lead line~~The terminal block 8 is fabricated from materials able to withstand high temperatures~~includes a protrusion part 24 and that are strong insulators, such as Teflon ®, and are equipped~~a rim part 25. The protrusion part 24 mates with flat terminals 10 (described below), which are provided~~the protrusion part 19 of the lower insulating member 6 by means of the through holes 26. Similarly, the rim part 25 mates with flat~~the upper insulating member 5 and contacts the protrusion part 11 of the stator

~~core 2. The terminal pin parts 29 for connecting the lead lines 9 and the stator coil wires. Said lead lines 9 are disposed in multiple lead line~~block 8 also includes fastening grooves 32, ~~described below. Fastening protrusions 22 are fabricated on both sides of said lead line fastening grooves 32. Said fastening protrusions 22 either side that fit into the holes 47 that are fabricated in the cover 7, and secure~~on the lead line terminal blocks 8 and the upper cover 7. Furthermore, mating protrusion parts 24 are fabricated, where said mating protrusion parts 24 fit into the through holes 26 equipped inThe terminal block may be made of a material that is a strong insulator and can withstand high temperatures, such as Teflon®. Alternatively, the structure of the protrusion parts 19 fabricated in said otherpart 19 of the lower insulating member 6. ~~Note that the protrusion parts fabricated in said other insulating member 6 and in said cover 3 may, conversely, [be fabricated in]~~6 may be fabricated on the one insulating member 5 and the cover 7, in which case, the mating protrusion part 24 fabricated in said lead line terminal block 8 is equipped in the direction for mating with the oneupper insulating member 5. Furthermore the lead line terminal block 8 is equipped with a rim part 25 that contacts the Likewise, the structures on the upper 7 and lower 3 covers may be interchanged, with a similar inversion of the rim 25 and protrusion parts 11 of the stator ~~core 2 on the surface that is on the opposite side from said mating protrusion part 24.~~ 24 part of the terminal block 8.

[0030] ~~The lead line~~ During assembly, the terminal blocksblock 8 fits into the indentation ~~part~~part 12 of saidthe stator core 2, ~~where the~~2. The mating parts 16, 18 of the one insulating member lower 6 and of the otherupper 5 insulating member 6members are inserted into the coil wire part 17 from both sides of the stator coil 2 to

~~cause~~core 2. The rim part 16 aligns with the stator magnetic pole teeth 14 and the rim part 16 to align with each other.~~14.~~ Furthermore, ~~the outsides of the one insulating member 5 and the other insulating member 6 are covered with covers 7 and 3, where~~ The protrusion parts 44 and 46 on of the one upper insulating member 5 and the other insulating member 6 fit into the holes 43 of the upper cover 7, and the protrusion parts 46 of the lower insulating member 6 fit into the holes 45 in of the covers 7 and 3 to form lower cover 3.

[0031] Fig. 2 is an underside view of the stator assembly.~~Figure 1 of Fig. 1.~~ Fig. 2 is a figure wherein shows the bottom insulating member 6, the other insulating member 6 and stator core 2, and the terminal block 8. When assembled, the stator core 2 are shown turned upside down from [that which is shown] in Figure 1 in order to more easily understand rim part 25 of the lead terminal blocks 8. As is shown in Figure 2, the lead line terminal blocks block 8 makes contact with the rim 25 on the side wherein the one upper insulating member 5 and is equipped on held in place by the tips 13 of the protrusion parts part 11 fabricated on the outer periphery of the stator core 2. The mating protrusion parts 24 of the terminal block 8 fit into the through the holes 26 fabricated in on the other lower insulating member 6.

~~As is shown in Figure 6, the flat terminals 10 are fabricated out of, for example, phosphor copper, which can be resistively welded or arc welded, and flat terminal pin parts 29, to which the lead lines 9 attach, are equipped on the tips thereof, where the flat terminal pin parts 29 are bent to approximately 90 degrees relative to the terminal parts 40. Furthermore, through holes 39 are fabricated on the edge that is opposite of the edge on which the flat terminal pin parts 29 are fabricated, where the protrusion~~

~~parts 41 fabricated on the lead line terminal parts 8 fit into said through holes 39. In addition, the rim-shaped weld parts 38 are fabricated on the opposite sides of the terminal parts 40 from the sides whereon the flat terminal pin parts 29 are bent, fabricated so as to provide a space through which the stator coil wires pass. The tips of the stator coil wires, not shown, are resistively welded to said weld parts 38 after passing through said gap between said weld parts 38.~~

[0032] ~~Figure 3 is used to explain~~Fig. 3 are views of the structure of the lead line terminal blocks ~~8,8 of Fig. 1.~~ The top surface of the lead line terminal block 8 is fabricated ~~with~~includes an indentation, ~~where~~having multiple lead line fastening grooves 32, fastening protrusion parts 22, multiple through holes 31, and a through grooves 33 are each fabricated, as described below, in said groove 33. The indentation part. The fastening protrusion parts 22 are fabricated both sides of each individual lead line fastening groove 32. Said fastening protrusion parts 22 are formed so as to be also includes protrusion parts 22, which are higher than the top surface of the lead line terminal part 8, ~~so as to~~block 8 and fit into the holes 47 ~~fabricated in~~on the upper cover 7,7 to thereby secure the lead line terminal block 8 ~~and to~~the upper cover 7,7 upon assembly. Multiple ~~The~~through holes 31, which pass groove 33 is between through the holes 31 and fastening grooves 32, and extends to the bottom surface of the lead line of the terminal block 8, are fabricated at the positions opposite the lead line fastening groove 32. ~~A8. The~~ through groove 33, which passes through the bottom surface of the lead line terminal block 8, between the lead line fastening groove 32 and the multiple through holes 31, in the direction in which said ~~which~~ multiple through holes 31 are lined up. ~~The respective lead line fastening~~31 are aligned with the fastening

~~grooves are equipped with lead lines 9, which are provided with connection terminals 30, which are connected at their tips to the flat terminal pin parts 29 using arc welding. The flat terminal pin parts 29, as described below, are equipped 32 on the top surface either side of the lead line terminal block 8, passing the through the respective through holes 31 from the bottom surface of the lead line terminal block 8. Furthermore, the outer surface of the fastening protrusion part 22 is fabricated with a rim part 25 that contacts the protrusion part 11 of the fixed core 2. groove 33.~~

[0033] Multiple pin parts 29 of flat terminals 10 pass through the through holes 31. The lead lines 9 have connection terminals 30 at their ends. The connection terminals 30 are welded to the pin parts 29 to connect the lead lines 9 to the stator assembly 1. The lead lines 9 sit in the fastening grooves 32.

[0034] ~~The bottom surface of the lead line terminal block 8 is fabricated with also has an indentation part, where not only do the multiple through holes 31 and the through groove 33 pass through the top surface of the lead line terminal block 8, but protrusion parts 41 are fabricated as shown in the indentation part, and multiple slack pins 36 and fastening pins 34 are embedded therein Fig. 3. The width W1 and depth D1 of the bottom surface of the lead line terminal block 8 are, respectively, approximately the same as the width W2 and the depth D2 of the indentation part 12 of the stator core 2 so that the lead line as shown in Fig. 1. The indentation includes the through groove 33 from the top surface of the terminal block 8 and two rows of structures either side of the through groove 33. One row of structures includes alternating fastening pins 34 and anchor posts 41. The other row includes the through holes 31 from the top surface of the terminal block 8 alternating with slack pins 36. The bottom surface of the terminal~~

~~block 8 can also includes the protrusion parts 24 that fit into through the indentation part 12 of holes 26 on the stator core 2. The lower insulating member 6 and are parallel to the slack pins 36 for guiding the stator coil wire are equipped between said multiple through holes 31. Said slack pins 36 are engraved with a notch at, for example, the base thereof, so as to be able to be bent easily from the base of said lead line terminal block. On the opposite side from where the aforementioned slack pins 36 are equipped, crossing said through groove 33, there are equipped fastening pins 31 on which the stator coil wire tips are wrapped. Said fastening pins 34 preferably have an essentially rectangular pillar shape so that the stator coil wire wrapped thereon does not come off, and should be equipped and disposed so as to be mutually at an angle with the flat terminals 10. 36.~~

[0035] The aforementioned flat

~~Flat terminals 10 are equipped so as to cut across the aforementioned traverse the through grooves 33, where the groove 33. The top sides of the flat terminals 10 are adjacent the through groove 33. Each flat terminal has a hole 39 that accepts an anchor post 41 on the indentation of the bottom surface of the terminal block 8. Each flat terminal also has a weld part 38 on the bottom side of the flat terminal 10 and a pin part 29. The pin parts 29 are inserted pass through the though holes 31 from the bottom surface of the lead line terminal blocks 8 into bottom surface of the terminal block 8 to emerge from the aforementioned through holes 39 and pass through the top surface thereof. The flat terminal pin parts 29 that have been passed through in this way have a height that is less than that of the indentation parts of the lead line terminal blocks 8, and are connected to the connection terminals on the tips of the lead lines 9~~

~~that are disposed in said lead line fastening grooves 32. Note that the protrusion parts 41 are fitted into the through holes 39 of said flat terminals 10. The stator coil wire tips 35 are passed through the gaps of the rim-shaped weld parts 38 formed on the flat terminals 10, past the slack pins 36, and are wrapped several times around the fastening pins 34. The stator coil wire that passes through the gaps in the weld part 38 is subjected to resistive welding, described below. Mating protrusion parts 24 that are held in the direction in which the slack pins 36 are established, or in other words, in the direction of the other insulating member 6 are fabricated at both ends of the lead line fastening grooves 32. These mating protrusion parts 24 are fitted into the through holes 26 that are equipped in the protrusion parts 19 of the other insulating member 6.~~
surface.

[0036] Stator coil wire is connected to the terminal block 8 by running the tip 35 of the stator coil wire past the slack pin 36, through the weld part 36, and around the fastening pin 34. The tip 35 is wrapped around the fastening pin 34, which preferably has an essentially rectangular core section to secure the stator coil wire and is at an angle to the flat terminal 10. The slack pins 36 preferably have notches near their bases 20 so as to facilitate bending. The stator coil wire that passes through the gaps of the weld parts 38 are subject to resistive welding.

[0037] Figures Fig. 4 and Fig. 5 will be used to explain diagrams showing cross sections of a part of the stator assembly unit 1 wherein the lead line terminal blocks 8, which are fabricated separately from the stator core 2, are fitted, and where covers 7 and 3 are provided on the outside of the one insulating member 5 and the other insulating member 6, provided on both sides thereof Fig. 1. The lead line terminal

~~blocks 8, which are fitted into~~block 8 fits in the indentation parts in part 12 of the stator
core 2,2 contactwhere the rim part 25 of the terminal block 8 is in contact with the
protrusion part 11 of the stator core 2. The matingtop insulating member 5 is in contact
with the protrusion part 20 of the top cover 7 and the surrounding standing wall 7a of the
top cover 7. The protrusion parts 24 of the terminal block 8 fit into the~~through the~~holes
26 fabricated in the other~~lower~~insulating member 6. For the one insulating member 5
~~contacts the protrusion parts 20 of the cover 7, and contacts the surrounding standing~~
~~wall 7a, while the other~~The lower insulating member 6 contacts the protrusion parts 21~~is~~
in contact with the lower cover 3,3 and contacts the~~its~~surrounding standing wall 3a.

[0038] Fig. 6 is a diagram of a flat terminal 10. The flat terminals 10 may be
composed of a material which may be composed of a material that may be resistively
welded or arc welded, such as phosphor copper. The flat terminal 10 has a pin part 29
that is bent at approximately 90 degrees to the terminal part 40 of the flat terminal 10.
The terminal part 40 has a hole 39, opposite the pin part 29, that accepts the anchor
posts 41 of the terminal block 8. The weld part 38 is on the face of the flat terminal 10
that is opposite the direction of the pin part 29. The weld part 38 defines a space with
respect to the terminal part 40 through which the tip 35 of a stator coil wire passes. The
tip 35 is resistively welded to the weld part 38.

[0039] ~~Figure~~Fig. 7 is an assembly~~a diagram illustrating another preferred~~
~~embodiment of a fixed~~the stator assembly structured with said lead line~~1 of Fig. 1. In~~
~~Fig. 7, the terminal block and said insulating member integrated~~8 is divided~~into a~~
~~single unit, where the lead line terminal blocks 8 are split in half horizontally from~~
~~part~~two parts along the plane G shown in Figure 3(a), in a structure where said separate

~~units are equipped with, respectively, one insulating member 5 and another insulating unit 6. In other words,~~of Fig. 3, i.e. the part above partplane G shownis in Figure 3(a) is fabricated into protrusionsthe protrusion 81 onof the oneupper insulating member 5, and the part below theplane G part shownis in Figure 3(a) is fabricated intothe protrusion parts 80 onof the etherlower insulating member 6. Note thatThe protrusion 81 is on the structureperiphery of the upper insulating member 5 and includes the through holes 31 and the through groove 33. Also, the protrusion 81 includes the grooves 32 for the lead lines 9. Protrusion parts 50 on to terminal block 8 are on either side of the through groove 33 where the protrusion 81 contacts the stator core 2 is the same as in the example embodiment in Figure 1-2.

~~In Figure 7, the symbols are the same for the same parts as explained in Figures 1 and 3, and thus their explanations will be omitted. The other insulating member 5 has protrusion parts 81 on its periphery, where the protrusion parts 81 are fabricated with multiple through holes 31 and through grooves 33. Furthermore, on the side of the protrusion part 81 that is opposite the side that contacts the stator core 2, or in other words, the side that supports the cover (7), not shown, multiple lead line fastening grooves 32 are fabricated, as shown in Figure 3(a). Protrusion parts 50 are fabricated at both ends of the through groove 33, on the side wherein the protrusion part 81 contacts the stator core 2.~~

[0040] ~~The etherlower insulating member 6 has a protrusion parts 80 abouton its outer periphery, where multiple through holes 31 and through grooves 33 are fabricated in said protruding parts 80. Furthermore, indentations are fabricated onThe protrusion 80 has an indentation sunk into the side that is opposite of the side of the~~

~~protrusion parts 80 that contact~~to the stator core 2, ~~or in other words, on the side that supports the cover (3), not shown, where.~~ The indentation includes multiple through holes 31 and through grooves 33 pass through the inside of said indentation part. Furthermore, ~~protrusion parts 41 are fabricated on one side of the through grooves 33, and there are embedded fastening pins 34.~~the through groove 33. On one side of the through groove 33 are anchor posts 41, and on the other side of saidthe through groove 33,multipleare slack pins 36 ~~are embedded between~~alternating with the ~~multiple through holes 31, fabricated~~31. This may be also seen from Fig. 3b as shown in Figure 3(b)described above. The ~~mentioned~~slack pins 36 ~~can~~may include notches engraved at their bases 20, which may be bent easily from the base of said lead line~~from the base of the terminal block, for example, with a notch engraved at the base thereof.~~8. ~~The protrusion part~~Protrusion 80 ~~is fabricated with~~includes through holes 51 on both ends of the through groove 33. The indentation parts ~~12 fabricated in~~of the protrusion parts ~~11 of the stator core not only mate with said protrusion parts 80 and 81, but said protrusion parts 50~~2 have protrusions 50, which fit into the through holes 51,51 and ~~whereupon the tips thereof are welded so that~~in order to secure the oneupper insulating member 5 and the ~~other~~lower insulating member 6 ~~are secured to both sides of the stator core 2.~~

[0041] The stator assembly 1 ~~in Figure~~of Fig. 1 ~~is~~may be assembled as ~~described below~~in the following manner. ~~In other words, the flat~~Flat terminal pin parts 29 are inserted into the multiple through holes 31 and ~~in~~the lead-terminal blocks 8, ~~for which said fastening protrusion parts~~block 8. The anchor posts 41 are matedmate with the through holes 39 ~~fabricated in~~of the flat terminals 10, ~~are~~10. The terminal block 8 is

mated with the indentation parts 12 fabricated on the protrusion ~~protruding parts~~ part 11 of the stator core 2. The ~~one insulating member 5 and the other~~ lower insulating member 6 are ~~fitted and the upper insulating member 5 fit tightly from both sides on~~ either side of the stator core 2, ~~where and the aforementioned mating~~ protrusion parts 24 are ~~mated~~ mate with the through holes 26 ~~and at the tips.~~ The tips of said the mating protrusion parts 24 are welded to fasten the one lower insulating member 5 and the ~~other~~ upper insulating member 6 to the stator core 22.

[0042] With reference to assemble Fig. 3, the stator assembly unit. Figure 3 will be referenced, below, to explain the resolver connection method using the stator assembly unit 1 in Figure 1, described above. The stator core coil wires, (not shown, are wrapped on) wrap around the respective magnetic poles of the stator assembly unit 1, where the 1. The tips 35 of the stator coil wires thus wrapped are wrapped onto the tips of the fastening pins 34 after passing between the weld parts 38 fabricated by bending the flat terminals 10, and passing across the slack pins 36. The weld parts 38 of the flat terminals 10 are bent to secure the tips 35 of the stator coil wires.

[0043] The two electrodes of a resistive welder, not shown, are inserted into may respectively contact the through grooves 33 to push on the weld part from the weld part 38 and top and side of each flat terminal 10 to bend the weld part 38 onto the bottom to side perform of the resistive welding flat terminal 10 and retain the tip 35 of the stator coil wire. The result is electrode that contacts the top side of the flat terminal 10 does so by passing through the through groove 33 from the top side of the terminal block 8. Thereafter, the stator coil wire is resistively welded to the flat terminal 10. In this manner, the tips 35 of the stator coil wires 35 that pass through the weld parts 38

~~are for~~ attached ~~attachment~~ to the flat terminals 10 ~~by the weld parts 38.10.~~ The ~~above~~ mentioned slack pins 36 thereafter ~~are then bent out to~~ secure the tips 35 of the stator coil wire to the terminal block 8.

~~Next, connector terminals 30, the tips of which being press fitted onto the lead lines 9, are equipped along the lead line fastening groove 32, where said connector terminals 30 mate with the flat terminal pin parts 29 that are inserted into the multiple through holes 31 and that pass through one surface [thereof], and said flat terminal pin parts 29 and connection terminals 30 are arc welded [together]. Said lead lines 9 are connected to the stator coil wires 35 that are welded to the flat terminals 10 at the weld part 38 by said flat terminal pin parts 29. Note that the bending out of said slack pin 36 can be done after completing said arc welding.~~

[0044] The tips of the connector terminals 30 are press fitted onto the lead lines 9. The lead lines 9 sit in the lead line fastening grooves 32. The connector terminals 30 mate with the ends of the flat terminal pin parts 29 passing through the terminal block 8 via the through holes 31. The flat terminal pin parts 29 and connection terminals 30 are arc welded together. In this manner the lead lines 9 connect to the tips 35 of the stator coil wires. The bending of the slack pins 36 may be performed after completing the above-mentioned arc welding.

[0045] ~~The~~ With reference to Fig. 7 the stator assembly unit 1 in Figure 7 ~~is may be assembled as described below follows. In other words, not only~~ The flat terminals 10 are mounted on the terminal block 8 by inserting the flat terminal pin parts 29 inserted into the multiple through holes 31 fabricated in ~~on~~ the one upper insulating member 5, but also ~~5.~~ Additionally, the anchor posts 41 of the terminal block 8 accept the through holes 39 fabricated in ~~of~~ the flat terminals 10 are mated with the fastening

~~protrusion parts 41, and the~~10. The flat terminal ~~part~~terminals 10 are ~~secured so as to~~
~~cut across~~traverse the through grooves ~~33~~groove 33 as is shown in figure 3b. The
~~protrusion parts~~Protrusion 81 and ~~80 of the one of the upper~~ insulating member 5 and
~~the other and~~ protrusion 80 of the lower insulating member 6 are fit tightly fitted into
either side of the indentation parts ~~12 of the stator core 2 from both sides of the stator~~
~~core 2, where the through holes 51 and~~2. The protrusion parts 50 and through holes 51
are mated ~~together~~ and the tips of ~~said~~the protrusion parts 50 are welded ~~to secure,~~
thereby securing the ~~one~~upper insulating member 5 and the ~~other~~lower insulating
member 6 ~~to the stator core 2, to thereby assemble the stator assembly unit.~~ core 2.

~~Next Figure 3 will be referenced in explaining, below, the resolver attachment~~
~~method using the stator assembly unit 1 in Figure 7, described above. The stator coil~~
~~wires, not shown, are wrapped onto each of the magnetic poles of the stator assembly~~
~~unit 1, and the tips 35 of the stator coil wires thus wrapped are passed past the slack~~
~~pins 36 and through the space between the weld parts 38 that are bent and fabricated~~
~~on the flat terminals 10, after which they are wrapped onto the tips of the fastening pins~~
~~34. The electrodes of a resistive welder, not shown, are inserted into the through~~
~~grooves 33 to perform resistive welding while pushing on the top and bottom of the weld~~
~~part. The result is that the stator coil wires 35 that pass through the weld parts 38 are~~
~~welded onto the flat terminals 10 by the weld parts 38. The aforementioned slack pins~~
~~36 are then bent out.~~

~~Next the connection terminals 30, the tips of which being press-fitted onto the~~
~~lead lines 9, are disposed along the lead line fastening grooves 32, where said~~
~~connection terminals 30 are mated with the flat terminal pin parts 29 that have been~~

~~inserted into the multiple through holes 31 and passed through one surface thereof, and the flat terminal pin parts 29 and the connection terminals 30 are are welded [together]. Said lead lines 9 are connected to the stator coil wires 35, which have been welded to the flat terminals 10 by the weld parts 38, through the aforementioned slack pins 36.~~

~~The resolver I/O terminal structure according to Claim 1 makes it possible for the aforementioned lead line terminal blocks to not only have fastening pins, on which the stator coil wire tips are wrapped, embedded therein, but also to have multiple through holes and through grooves in the direction said multiple through holes are lined up, so that the flat terminals that are provided with flat terminal pin parts that connect said lead lines and the stator coil wires [together] are equipped horizontally on said lead line terminal blocks so as to cut across said through grooves to make it possible to provide connection terminals that connect the tips of said lead lines to said flat terminal pin parts, thereby making it possible to not only reduce the size of the terminal plates, but also making it possible to produce small resolvers for high ambient temperatures, wherein, for example, polyamidimid wires, or the like, which have strong and robust insulation, can be used for the resolver stator coils because it is possible to insert the electrodes of a resistive welder into said through grooves easily. Furthermore, said lead lines need not be wrapped onto the stator coil lines after the stator has been installed, simplifying the structure of the jigs for the automatic winders, thereby simplifying automation.~~

~~In the resolver I/O terminal structure according to Claim 2 said lead line terminal block is not only formed with multiple lead line fastening grooves on one surface thereof, but the opposite surface is equipped with slack pins to guide the stator wires to~~

~~the side wherein said multiple through holes are lined up, and fastening pins for wrapping the stator coil lead lines on the side opposite of where said slack pins are equipped, across said through groove, where said slack pins can be bent up easily from the base of said lead line terminal block, thus eliminating the need to wrap the stator coil wires with said lead lines attached to the stator, [thereby] simplifying the structure of the jig in the automatic winding equipment. Furthermore, although there are slack pins equipped in conventional jigs, said slack pins can be bent out easily from the bases of the aforementioned lead line terminal blocks, simplifying the jig structure.~~

~~In the resolver I/O terminal structure according to Claim 3, said lead line terminal block is fabricated with a surface whereon said fastening pins and slack pins are provided, and fabricated with a mating protrusion part on the other surface, where said mating protrusion part fits together with through holes fabricated in either said one insulating member or said other insulating member, thus making it possible to secure said mating protrusion parts in the axial direction through welding.~~

~~In the resolver I/O terminal structure according to Claim 4, said lead line terminal block is fabricated with a rim part that contacts the stator core on the surface on the side opposite from said mating protrusion part, thus not only making it possible to simplify the positioning relative to the axial direction, but also fastening in the axial direction.~~

~~In the resolver I/O terminal structure according to Claim 5, said lead line terminal block is fabricated separately from the one insulating member and from said other insulating member, not only increasing the degrees of freedom in the design, but also making it possible to use lead line terminal blocks suitable to specifications such as high temperature ambient environments.~~

~~In the resolver I/O terminal structures according to Claims 6 and 7, said lead line terminal block is structured as an integrated unit with said one insulating member or with said other insulating member and said lead line terminal block is structured from a top terminal block and a bottom terminal block split between one surface and another surface, thus not only making it possible to simplify the structure in the resolver when used in a use environment that is not as harsh, but also making it possible to reduce costs.~~

~~In the resolver I/O terminal structure according to Claims 8 and 9, said flat terminal is such that said flat terminal pin part is deflected to an angle of approximately 90 degrees relative to the flat terminal and is not only inserted into an aforementioned through hole, but also passes through the other surface so that the flat terminal pin part that is passed through said through hole connects to a connector terminal equipped along said lead line fastening groove, where said flat terminal is fabricated with a rim-shape weld part bent at the location wherein said through groove is crossed, thus making it possible to use a resistive welder to weld together the stator wires and the weld parts easily.~~

~~In the resolver connection method according to Claim 10, the lead line terminal block, to which the flat terminals have been attached, is fastened to the stator core, the stator coils are wound, resistive welding is used to weld said weld parts to said stator coils, and said flat terminal pin parts and the connector terminals are are welded, thus simplifying automation.~~

~~In the resolver connection method according to Claim 11, after fitting, into an indentation fabricated in a protrusion of the stator core, a lead line terminal part, wherein~~

~~said fastening protrusions mate with through holes fabricated in the flat terminals, through the insertion of said flat terminal pin parts into said multiple through holes, the one insulating member and the other insulating member are each tightly fitted from both sides of the stator core in order to mate the through holes fabricated in one or the other of the aforementioned insulating members with the aforementioned mating protrusion parts, and the tips of said mating protrusion parts are affixed to the insulating member to form a stator assembly, thus providing a stator assembly unit for which the winding of the stator coil wires is easy.~~

~~In the resolver connection method according to Claim 12, stator coil leads are wrapped on said stator assembly, and the ends of said wrapped stator coil leads are passed through the slack pins and between the weld parts that are fabricated with a bend in said flat terminals, after which the tips thereof are wrapped on fastening pins, where the stator coil lead lines that are passed between said weld parts are welded to the flat terminals at said weld parts through resistive welding of said weld parts after inserting the electrodes of the resistive welder from the top and bottom of said through groove, and then bending said slack pins, thus making it possible to connect the resolver using a simple jig structure.~~

~~The resolver I/O terminal structure according to Claim 13, connection terminals of lead lines wherein connection terminals are pressed onto the tips thereof are equipped along said lead line affixing groove to mate with said connection terminals at said flat terminal pin part, which have passed through said one surface after being inserted into said multiple through holes, where said flat terminal pin part and the connection~~

~~terminals are then are welded together, thus making it possible to connect the resolver using a simple automatic coil wire jig structure.~~

[0046] Although the invention described herein is with reference to particular embodiments, it should be understood that these embodiments are merely illustrative of the principals and application of the present invention. It should therefore be understood that modifications may be made to the exemplary embodiments described herein, and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the following claims.